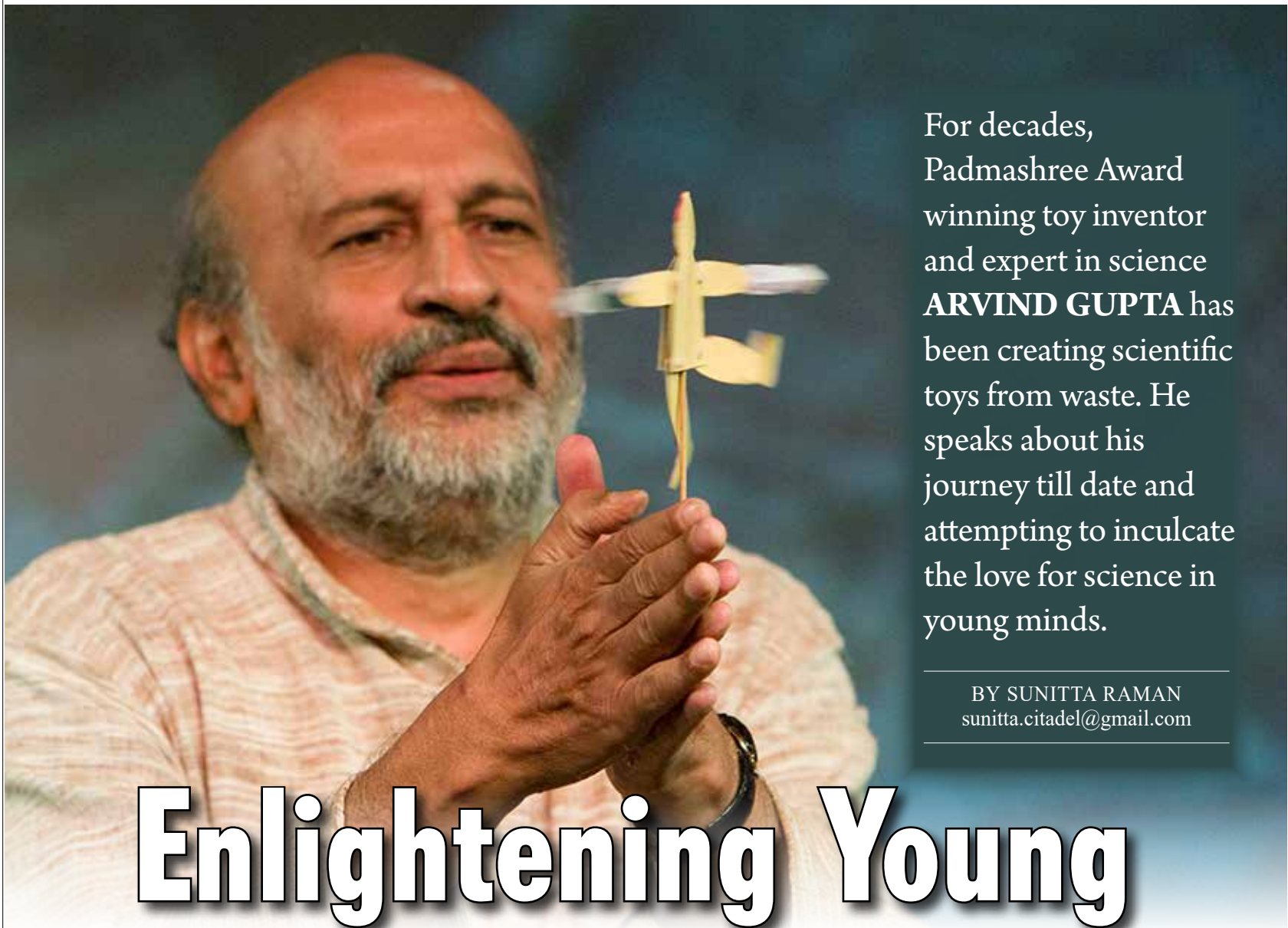


PEOPLE



For decades, Padmashree Award winning toy inventor and expert in science **ARVIND GUPTA** has been creating scientific toys from waste. He speaks about his journey till date and attempting to inculcate the love for science in young minds.

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# Enlightening Young

**I**t is sometimes difficult to compartmentalize someone because their journey has been full of surprises. What makes their work more prolific or successful is that it cannot be defined by any set benchmark. Arvind Gupta is one such gentleman. A toy inventor and an expert in science, he has been successful in popularizing science among school children in both cities and villages. Gupta is also an advocate of

# Minds

using of simple domestic materials that we call trash, which can be converted into scientific toys. The mind-set behind these inventions is to develop a scientific temper and rational thinking in school-going children.

You can call him a simple man with a Gandhian outlook to life, whose contribution to teaching science through toys gives us an insight into his work and philosophy. A man who hailed from a simple yet humble background,

where children were encouraged to study. Though both his parents were unschooled, his mother realized the value of education. The Padmashree awardee walks down memory lane of his hardships, experiences and triumphs.

## A JOURNEY INDEED

In the 1970s, after graduating from the prestigious Indian Institute of Technology in Kanpur, and armed with a degree in Bachelors in Technology in Electrical Engineering (B. Tech), Gupta joined Tata Motors and worked there for two years.

During this period, a pioneering experiment was conducted by the Hoshangabad Science Teaching Programme in Madhya Pradesh, aimed to revitalize science learning in village schools. Instead of the standard burettes and pipettes, they used simple and readily available apparatus to make science fun and enjoyable. HSTP started initially with 16 schools, and later went ahead in taking on 1200 schools.

Gupta recalls that this was a turning point in his life at the Hoshangabad

Science Teaching Programme. “There was a weekly village bazaar that I would visit, where people sold their wares on the roadside. I used to buy glass and plastic bangles, little boxes, mirrors, etc. On one such occasion, when I was getting my cycle tube inflated, I saw a thin black rubber tube hanging. I bought 10 feet of this rubber valve and began working on it. Within a month, I had used little bits of this rubber valve tube and matchsticks and fashioned them into two- and three-dimensional matchstick models. This enthralled me to no end. It was an ‘Aha!’ moment for me. This is what got me hooked to activity-based science teaching. A few years later, I wrote my first book, *Matchstick Models and Other Science Experiments*. It was a thumping success. It was translated in a dozen languages and is still in print even after thirty years,” he reminisces fondly.

Gupta was fortunate enough to meet Dr Anil Sadgopal, who had completed his Ph.D in molecular biology from Caltech University and was working at the prestigious Tata Institute of Fundamental Research (TIFR). He left

his job and started the Hoshangabad Science Teaching Programme (HSTP).

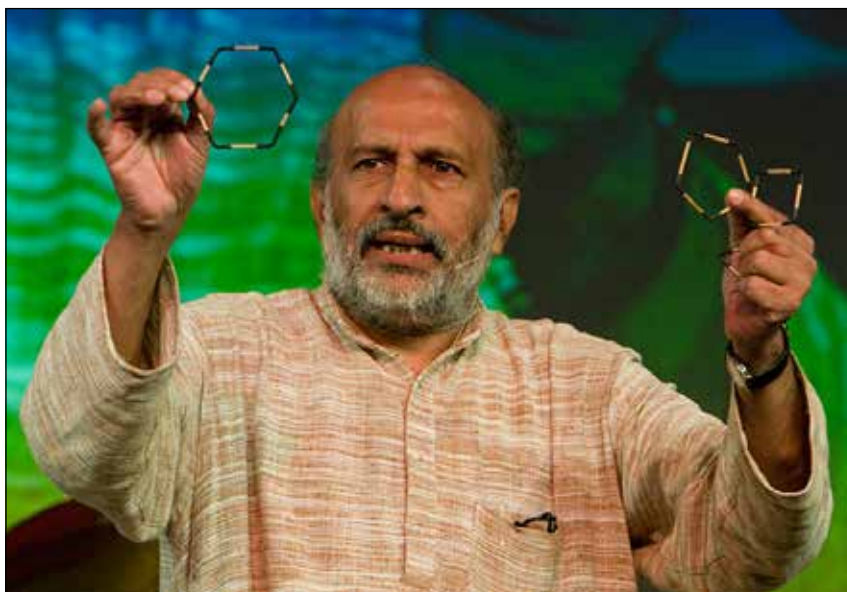
“I was only eighteen years old when I had the privilege of hearing his lecture at IIT Kanpur. It had a great impact on me. In HSTP, one looked forward to inventing low-cost science experiments. We designed several experiments on the humble matchbox. Later on, I translated *Joy of Making Indian Toys* by Prof. Sudarshan Khanna in Hindi for National Book Trust. This book lists 100 toys, which can be made from the simplest of materials lying around the house. This propelled me to delve deeper into the making of toys. Today, we live in a consumerist society, where the credo is ‘Buy More and Throw More’. We have designed more than fifty toys using Tetrapaks, Frooti cartons and Dhara packets. We have documented over 100 activities using plastic bottles. There is no dearth of plastic. They are littering our environment. We’ve also put the good old newspaper to much use by making a dozen caps.”

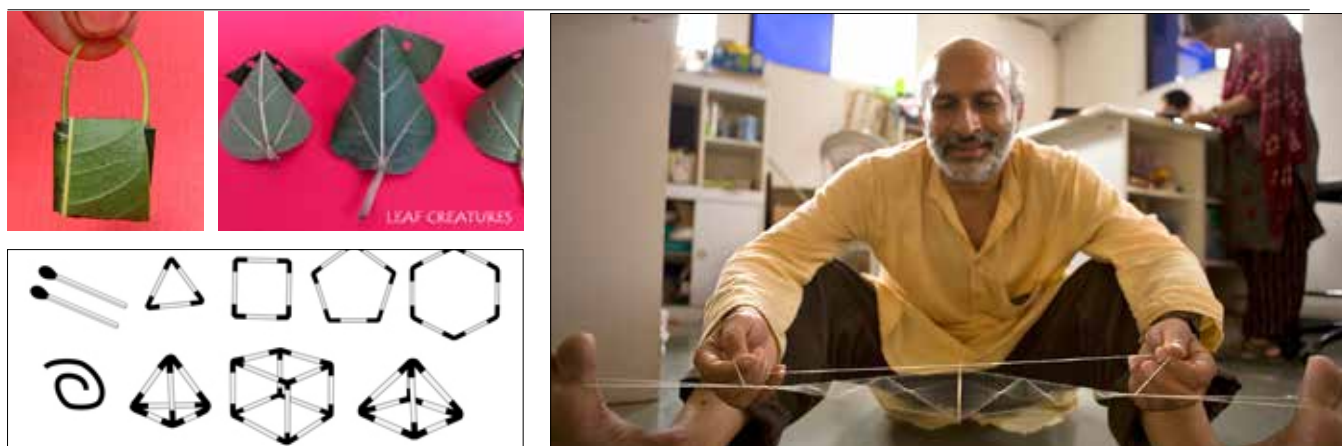
The main aim behind this effort is also to teach children how to make things from throwaway materials and sensitize them about the environment.

## MOVING AHEAD

Adding to his interesting repertoire of experiences, Gupta recalls his fourteen years in New Delhi. “For six years, I ran a science club in a small experimental school — Mirambika. Our daughter Dulari completed her standard twelve from Sardar Patel Vidyalaya and went to study at the Christian Medical College in Vellore.”

In 2003, the Guptas decided to pack up their bag and baggage and return to Pune. “Here, I was invited by Prof. Jayant Narlikar to work at the Inter-





University Center for Astronomy and Astrophysics (IUCCA) Children's Science Centre, whose building was funded by Pu La Deshpande, a great philanthropist, prolific writer and a cultural icon of Maharashtra. I worked in the Children's Science Centre for eleven years from 2003-2014. We had a very dynamic team consisting of two other individuals – Vidula Mhaiskar, a post doctorate from Stanford University, and Ashok Rupner—a passionate science populariser. This team did a great job. We made over 1100 short videos on 'Toys from Trash' in English. These videos are just one or two minutes duration – crisp and captivating. These videos have been dubbed by volunteers into 18 different languages. So today, we have 8,600 videos on YouTube with a viewership of over 65-million!"

You can also find passionate books on Education, Science, Mathematics, Environment, Peace and Children's Books. "Every day, over 10,000 books are downloaded. This is an indicator of the hunger for good knowledge in our people. My role at the centre was to invite the best of people to come and share their ideas and inspire us with their world view. It is embarrassing that most of the credit goes to me, while my colleagues did most of the hard work!"

## DEVELOPING A SCIENTIFIC MINDSET

One is curious to know if Gupta's toys can develop a scientific temper and rational thinking in children. His answer throws ample light on our education system. "In most of our schools, science is very bookish and often learnt by rote. Most good schools have well equipped science labs, but until the 9<sup>th</sup> standard, no children are allowed to enter the science lab. Later, a good teacher may take them to the lab, but still children don't get to touch any equipment. In most of the science labs, the test tubes, pipettes, etc, are often locked in the cupboard covered with a grime of dust. Schools forget that the child's mind is much more precious and sacred than the apparatus in the cupboards."

If you ask him to talk further, Gupta is of the view that play is universal and even those children who hate science, or don't have the chance to go to school should love to play. "We thought, why not let children make their own toys and have a great time. And when made from discarded junk, they cost very little. Many toys have inbuilt scientific principles and children learn these concepts intuitively without being taught. They need to work with concrete things before they understand abstract concepts. These toys allow them to make things, put them together and see how they work. If a toy doesn't work, the child has to only work harder to make it work."

On a topic or area close to his heart, Gupta could go on talking endlessly. He states that being evidence-based is science. "In science, one cannot propose a wild theory and get away with it. Working with simple models, children can test a theory, prove or disprove it. This certainly helps them to build a scientific attitude. If someone proposes a wild theory, they will demand proof and evidence to support it. In a democratic country, science should help the poorest. 'Toys from Trash' experiments are very affordable. That is why hundreds of groups working with poor children use these simple toys and experiments to inculcate a love for science among the most marginalized children."

## SCHOOL TIME

Under his able leadership and support, many municipal schools have been taken under his wings and a love for science has been inculcated. One wonders if he has any plans on the anvil to reach out to public and private schools as well. "It is true that we have given priority to municipal school children, because they need us the most. But many private schools use our materials too. We conducted two workshops a week in our centre. Being very small, this limited our physical interaction with children. But once we started uploading 'Toys from Trash' on our website, then we truly went





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global. Two years back, Germany took in 1 million Syrian refugees. Many German educators successfully used our Toys from Trash with migrant children.”

He further speaks about the Government of India’s ‘Atal Tinkering Labs’ initiated two years back. “Someone in the government realized that there will be no ‘Make in India’, unless children start making small models in schools. The government set up 500 ‘Atal Tinkering Labs’ in the first year and 1500

in the second year in both government and private Schools. It is a great initiative, which will give thousands of children an opportunity to develop skills and learn science the way it should be learnt – by doing.”

Ask him about what he thinks about the present curriculum of science today and pat comes the reply, “The science curriculum in schools is jaded – still the old chalk and talk method rules the roost. The reason is that most teachers themselves have not experienced the thrill of creation or learning through models as students. It is unlikely that they will be able to transmit that enthusiasm to children. On the other hand, there is enormous potential in our children. However, there has been a very gradual shift from rote learning to the ‘project’ method. There is a prevailing myth that science activities require expensive laboratories, which a poor country like India can scarcely afford. The Hoshangabad Science Teaching Program demolished this myth. ‘Toys from Trash’ have further proved that even the poorest children can afford them.”

### **FUTURE PLANS**

With such a fantastic mind-set, one is keen to know about his plans to further his mission of popularizing science in the future. Gupta has retired from the Children’s Science Center at IUCAA in Dec 2014. “I have been translating biographies of famous scientists in Hindi. There is a vibrant group, which is translating these biographies in other Indian languages – Tamil, Telugu, Marathi and Kannada. These are picture biographies of very inspiring scientists. What got them interested in science – was it an enlightened mother or an inspiring teacher? What are the basic questions they asked?”

He speaks about a small room measuring 400 sq ft in IUCAA, in which all science toys were created. “I feel there is a great need to have decentralized, one-room science activity centres spread out in each locality and each large housing complex. In a large country like ours, we desperately need tens of thousands of such centres run by enthusiasts for the local community from a single room in their own apartment. The children using these centres pay small fees to make them sustainable. There is a great demand for such an initiative in our society.”

Laying special emphasis on teacher’s training, one feels the need for special programmes where teachers are trained to make toys from trash. Gupta rues the fact that teachers follow a rigid curriculum and also pressures to complete the syllabus within the given time frame. “There are many who admire and appreciate these toys, but are unable to integrate these activities under the regular curriculum.”

As this inspiring and wonderful conversation with Gupta comes to an end, the question does arise of him finding time for his hobbies. He has an interesting answer, “I love watching trees and reading children’s books – especially the illustrated ones. If I can’t say hello to a tree, it is like a jab in my heart. So, over the years, I bought every popular book on Indian trees. I was privileged to live on the campus of the Pune University for 11 years. The University is a beautiful campus with an unusual range of trees. I would often take school children for ‘Tree Walks’. I would tell them interesting stories about each tree and in the end, children would make a toy from each tree. This was a fun activity for children.”

As the interview winds up, the pleasure of having spoken to one of the greatest minds in the country can leave anyone feeling both elated and nostalgic. ✪